

Application No: 10/779,454
Amendment B
Reply to Office Action Dated November 3, 2006

Attorney Docket No: 3926.063

REMARKS

Claims 1-18 are pending in the application. Claims 1-2, 5-8, 11, 15, and 17 have been amended.

Specification

Appropriate correction has been made to the headings according to the Examiner's suggestion.

Claim Rejections - 35 U.S.C. § 112

Claims 5-8, 11-15, and 17-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

The claims have been amended to overcome the rejections.

Claim Rejections - 35 U.S.C. § 102

Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Publication No. 10-26724.

The present invention concerns a door space monitoring device for monitoring a door swing area of a vehicle door. This device is mechanically connected with the vehicle door, especially it is provided in the area of the pivot axis of the vehicle door (see claim 6) or in the rear-view mirror of the vehicle door. The sensor includes a micro-mirror-unit, which is also called DMD-unit. The micro-mirror-unit consists of a plurality of small individual micro-mirrors, which rotate individually in their position. This micro-mirror-unit is used to pivot a light source in the area in front of the vehicle door for monitoring this area, in which the reflected light will be received and evaluated. It is not necessary to calculate the distance between the sensor unit and the detected object that interrupts the light beam. The presence of the interrupting object alone will be detected and depending thereon, a warning signal is given or further opening of the door is prevented.

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It is noted that the pivoting light beam can be parallel to the contour of the door, which can be realized especially through an additional non-planar mirror according to claim 3 of the instant application. This arrangement is a very simple and safe monitoring device according to the present invention. Alternatively, the monitored plane defined by the pivoting light beam can be so formed that the distance of the monitoring plane to the door expands with the increasing distance from the pivot axis (see claim 15).

JP 10-26724 discloses a multi-point distance measuring system, which has a micro-mirror-unit (DMD 16). The distance to a detected object or its extension can be obtained in connection with a consideration of multiple points of the object taking into consideration of a travel time. This multi-point distance measuring system is applied exclusively in connection with a camera (see paragraph [0014] of the disclosure). It is described there that the system is connected with a photo optical system 20 (see Fig. 1), which is part of a camera. Based on the measured distances to different points of a detected object, the camera is adjusted sharply accordingly. Further hint toward the exclusiveness of the application with camera/photograph can be found in paragraphs [0008] and [0012].

Clearly, JP 10-26724 only discloses the application of a multi-point distance measuring system for a camera. This reference does not provide any hint toward a door space monitoring system according to the present invention, especially not concerning the problem of such a system, which is especially marked by a robustness, compactness, and especially vibration resistance. With the door space monitoring system according to the present invention, it is not necessary to determine a distance to a detected object, especially not multi-point distance to the a detected object, but rather it is only necessary to determine the presence of the object. It is, therefore, clear that JP 10-26724 does not provide any hint toward realizing a door space monitoring system. Especially, JP 10-26724 does not provide any hint toward a combination or replacement of a sensor for another known door space monitoring system. Therefore, JP 10-26724 cannot be combined with another known door space monitoring system.

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Claims 1 and 10 are, therefore, believed to be patentable over JP 10-26724.

Claim Rejections - 35 U.S.C. § 103

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-26724 and further in view of Hornbeck (US 5,650,881).

Claims 5, 6, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-26724 and further in view of Mochida et al. (US 4,458,446).

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-26724 and further in view of Haas et al.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-26724 and further in view of Underwood (US 4,118,625).

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-26724 and further in view of Isogai et al. (US 2003/0090647).

Claims 16-18, as best understood by the Examiner, are rejected under 35 U.S.C. 103(a) as being unpatentable over Haas et al. and further in view of Isogai et al.

The dependent claims should be allowed upon allowance of independent claim 1.

Isogai et al. disclose a laser radar system having two pivotable mirrors 15, 16, which redirects the laser light of the laser source 13 and projects outwards. This reference does not disclose any micro-mirror-unit, which is also not disclosed in Haas et al. which also have the task of measuring a distance from an object, especially another moving vehicle. This makes clear that the sensor means and the laser radar device are different from the sensor means of the present invention, which has a micro-mirror-unit and does not require a distance measuring. Therefore, these documents also do not contain any hint toward the special circumstance and problems of a door space monitoring device.

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It is, therefore, clear that the document with the very expensive special laser radar source for the laser radar system is not suited to provide a hint toward an inexpensive, compact, and robust as well as flexible door space monitoring system according to the present invention. Also, the large planar mirrors disclosed in this document are in contrast to the micro-mechanical mirrors according to the present invention.

Hornbeck discloses a special formation of a micro-mirror-unit, which is also identified as DMD-unit. This special formation concerns the location and rotation of the individual micro-mechanical mirrors of the plurality of small micro-mechanical mirrors, which together form the micro-mirror-unit. Hornbeck does not provide any hint to substitute such a micro-mirror-unit. Especially, there is no hint of applying it as a component of a sensor for a door space monitoring device. The existence and the basic functionality of a micro-mirror-unit is explained in the background of the specification and is assumed to be in principle known. However, Hornbeck does not contain any hint toward the application of the micro-mirror-unit in the direction of the present invention and does not provide any advantage or problem in the direction of the present invention. A combination of Hornbeck with another reference is, therefore, not obvious.

Further, Mochida et al. disclose an ultrasound sensor supported door system for opening and closing a door, in which several ultrasound sensors monitor distinct three-dimensional regions A and B (Fig. 6) and obtain the distance to a disturbing object in the large monitored three-dimensional spaces A and B taking into consideration of travel time (see column 5, lines 17-62 in connection with Fig. 3). If the object is located in a predetermined distance, it will be considered as a disturbing object and the vehicle door will be controlled accordingly or a warning follows. The ultrasound sensors are provided in the region of the door grip or in the rear-view mirror located at the front end of the vehicle.

In contrast, the present invention does not use any ultrasound sensor and forms a monitoring area in the manner of a curtain, namely a two-dimensional monitoring area, due to which no distance measuring is required. The present invention further differs from Mochida et

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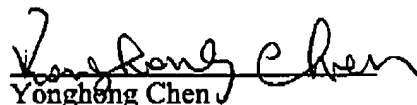
al. in that it enables a very compact arrangement under the application of a micro-mirror-unit for pivoting the light source to form a curtain-like monitoring area (two-dimensional) and that the sensor unit is provided in the area of the pivot axis of the vehicle door (see claim 6). This enables a very simple and effective monitoring with help of a curtain-like two-dimensional monitoring area. This is preferred so formed that the distance of the monitoring plane to the door expands with the increasing distance from the pivot axis. These aspects are not disclosed by Mochida et al.

In summary, Applicants believe that the present invention is patentable over the cited prior art. Especially JP 10-26724 contains no hint toward an application outside of photography. JP 10-26724 also does not disclose a system for detection of the presence of an object, but rather a multi-point distance measuring system that makes sense only in connection with a camera system. Since the disclosure of JP 10-26724 is so specific, it gives no hint that it can be combined with another reference, which discloses a door space monitoring system. Especially, a combination with Hornbeck is not appropriate because Hornbeck has the exclusive task of forming a DMD-chip or a micro-mirror-unit.

Favorable consideration and early issuance of the Notice of Allowance are respectfully requested. Should further issues remain prior to allowance, the Examiner is respectfully requested to contact the undersigned at the indicated telephone number.

Respectfully submitted,

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